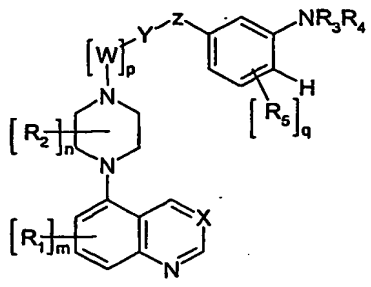
Claims

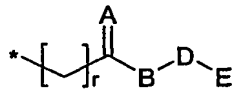
1. A compound of formula (I) or a pharmaceutically acceptable salt thereof:



(I)

wherein:

- R_1 is halogen, cyano, C_{1-6}alkyl, C_{1-6}alkoxy, haloC_{1-6}alkoxy or haloC_{1-6}alkyl;
- m is 0, 1, 2, 3 or 4;
- X is N or CH;
- R_2 is halogen, cyano, C_{1-6}alkyl, C_{1-6}alkoxy, haloC_{1-6}alkoxy or haloC_{1-6}alkyl;
- n is 0, 1 or 2;
- W is $-CH_2-$, -CH(C_{1-6}alkyl)- or -C(C_{1-6}alkyl)(C_{1-6}alkyl)-;
- p is 0, 1, 2 or 3;
- Y and Z together form a C_{3-7}cycloalkylene group, or Y is $-CH_2-$, -CH(C_{1-6}alkyl)- or -C(C_{1-6}alkyl)(C_{1-6}alkyl) and Z is $-CH_2-$, -CHOH-, $-CHR_6-$ or $-CR_6R_7-$ (wherein R_6 and R_7 are independently halogen, cyano, C_{1-6}alkyl or C_{1-6}alkoxy);
- R_3 and R_4 are independently hydrogen, C_{1-6}alkyl, C_{1-6}alkylsulfonyl or a group having the formula (II):



(II)

wherein

- r is 0, 1, 2, 3 or 4;
- A is oxygen or sulfur;
- B is a single bond or $-NR_8-$ (wherein R_8 is hydrogen, C_{1-6}alkyl or aryl, wherein the aryl is optionally substituted by one or more substituents independently selected from halogen, oxo, C_{1-6}alkyl, CF_3, cyano, hydroxy, C_{1-6}alkanoyl, and C_{1-6}alkoxy);
- D is $-(CH_2)_t-$, $-(CH_2)_tO-$ or $-O(CH_2)_t-$, wherein t is 0, 1, 2, 3 or 4; and
- E is C_{1-6}alkyl, haloC_{1-6}alkyl, C_{3-7}cycloalkyl (optionally substituted by one or more substituents independently selected from halogen,

hydroxy, oxo, C_{1-6}alkyl, cyano, CF_3, OCF_3, C_{1-6}alkoxy and C_{1-6}alkanoyl), aryl (optionally substituted by one or more substituents independently selected from halogen, oxo, C_{1-6}alkyl, CF_3, cyano, hydroxy, C_{1-6}alkanoyl and C_{1-6}alkoxy), or E is $-NR_9R_{10}$, wherein R_9 and R_{10} are independently selected from hydrogen, C_{1-6}alkyl and aryl (optionally substituted by one or more substituents independently selected from halogen, oxo, C_{1-6}alkyl, CF_3, cyano, hydroxy, C_{1-6}alkanoyl and C_{1-6}alkoxy);

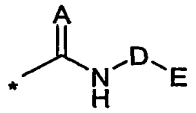
- or R_3 and R_4, together with the nitrogen atom to which R_3 and R_4 are attached, form a 3-7 membered monocyclic heterocyclic group or a 8-11 membered bicyclic heterocyclic group, wherein each group is optionally substituted by one or more substituents selected from halogen, oxo, C_{1-6}alkyl, cyano, CF_3, C_{1-6}alkoxy, C_{1-6}alkanoyl, aryl and arylC_{1-6}alkyl (wherein the aryl and the arylC_{1-6}alkyl are further optionally substituted by one or more halogen, oxo, C_{1-6}alkyl, cyano, CF_3, C_{1-6}alkoxy or C_{1-6}alkanoyl); and
- R_5 is independently halogen, cyano, C_{1-6}alkyl or C_{1-6}alkoxy; and
- q is 0, 1, 2, 3 or 4.

2. A compound as claimed in claim 1, wherein n is 0 or n is 1 and R_2 is C_{1-6}alkyl.

3. A compound as claimed in claim 1 or claim 2, wherein p is 0.

4. A compound as claimed in claim 1, 2 or 3, wherein Y and Z are independently -CH_2-, -$CH(CH_3)$- or -CH(OH)-.

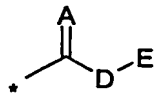
5. A compound as claimed in any of claims 1-4, wherein formula (II) is:



(IIa)

wherein A is oxygen or sulfur, D is $-(CH_2)_t$-, $-(CH_2)_tO$- or $-O(CH_2)_t$-, wherein t is 0, 1, 2, 3 or 4 and E is C_{1-6}alkyl, C_{3-7}cycloalkyl (optionally substituted by one or more substituents independently selected from halogen, hydroxy, oxo, C_{1-6}alkyl, cyano, CF_3, OCF_3, C_{1-6}alkoxy and C_{1-6}alkanoyl), or aryl (optionally substituted by one or more substituents independently selected from halogen, C_{1-6}alkyl, CF_3, cyano, hydroxy, C_{1-6}alkanoyl, and C_{1-6}alkoxy);

or



(IIb)

wherein A is oxygen or sulfur, D is $-(CH_2)_t-$, $-(CH_2)_tO-$ or $-O(CH_2)_t-$, wherein t is 0, 1, 2, 3 or 4 and E is C_{1-6}alkyl, C_{3-7}cycloalkyl (optionally substituted by one or more substituents independently selected from halogen, hydroxy, oxo, C_{1-6}alkyl, cyano, CF_3, OCF_3, C_{1-6}alkoxy and C_{1-6}alkanoyl), or aryl (optionally substituted by one or more substituents independently selected from halogen, C_{1-6}alkyl, CF_3, cyano, hydroxy, C_{1-6}alkanoyl, and C_{1-6}alkoxy).

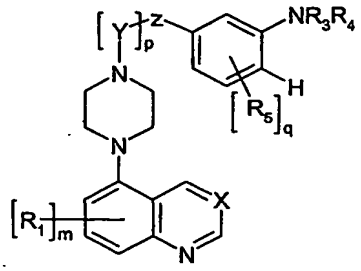
6. A compound as claimed in any of claims 1-5, wherein E is a 5- to 7- membered monocyclic aromatic ring wherein one or more of the carbon atoms in the ring is optionally replaced by a heteroatom independently selected from nitrogen, oxygen and sulfur, wherein the ring is optionally substituted by one or more substituents independently selected from oxo, halogen, C_{1-6}alkyl, CF_3, cyano, hydroxy, C_{1-6}alkanoyl, and C_{1-6}alkoxy; or E is a 9- to 10- membered bicyclic aromatic ring, wherein one or more of the carbon atoms in the ring is optionally replaced by a heteroatom independently selected from nitrogen, oxygen and sulfur, wherein the ring is optionally substituted by one or more substituents independently selected from oxo, halogen, C_{1-6}alkyl, CF_3, cyano, hydroxy, C_{1-6}alkanoyl, and C_{1-6}alkoxy.

7. A compound as claimed in any of claims 1-5, wherein E is methylamine, ethylamine, propylamine, isopropylamine, butylamine, isobutylamine, sec-butylamine, tert-butylamine, pentylamine, neopentylamine, sec-pentylamine, n-pentylamine, isopentylamine, tert-pentylamine, hexylamine; dimethylamine, diethylamine, dipropylamine, diisopropylamine, dibutylamine, diisobutylamine, disec-butylamine, ditert-butylamine, dipentylamine, dineopentylamine, dihexylamine, butylmethylamino, isopropylmethylamino, ethylisopropylamino, ethylmethylamino; a monoarylamino such as anilino; or a monoC_{1-6}alkyl-monoarylamino.

8. A compound as claimed in any of claims 1-7, wherein R_3 and R_4, together with the nitrogen atom to which R_3 and R_4 are attached, form a 4-6 membered monocyclic heterocyclic group optionally substituted by one or more substituents selected from oxo, halogen, C_{1-6}alkyl, cyano, CF_3, C_{1-6}alkoxy, C_{1-6}alkanoyl, aryl and arylC_{1-6}alkyl (wherein the aryl and the arylC_{1-6}alkyl are further optionally substituted by one or more halogen, oxo, C_{1-6}alkyl, cyano, CF_3, C_{1-6}alkoxy or C_{1-6}alkanoyl); or R_3 and R_4, together with the nitrogen atom to which R_2 and R_3 are attached, form a 8-10 membered bicyclic heterocyclic group optionally substituted by one or more substituents selected from oxo, halogen, C_{1-6}alkyl, cyano, CF_3, C_{1-6}alkoxy, C_{1-6}alkanoyl, aryl and arylC_{1-6}alkyl (wherein the aryl and the

arylC$_{1-6}$alkyl are further optionally substituted by one or more halogen, oxo, C$_{1-6}$alkyl, cyano, CF$_3$, C$_{1-6}$alkoxy or C$_{1-6}$alkanoyl).

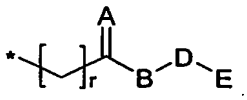
9. A compound as claimed in claim 1, having a general formula (Ia):



(Ia)

wherein:

- R$_1$ is halogen, cyano, C$_{1-6}$alkyl, C$_{1-6}$alkoxy, haloC$_{1-6}$alkoxy or haloC$_{1-6}$alkyl;
- m is 0, 1, 2, 3 or 4;
- X is N or CH;
- p is 1, 2, 3 or 4;
- Y is –CH$_2$-, -CH(C$_{1-6}$alkyl)- or -C(C$_{1-6}$alkyl)(C$_{1-6}$alkyl)-;
- Z is –CH$_2$-, -CHOH-, -CHR$_6$- or –CR$_6$R$_7$-, wherein R$_6$ and R$_7$ are independently halogen, cyano, C$_{1-6}$alkyl or C$_{1-6}$alkoxy;
- R$_3$ and R$_4$ are independently hydrogen, C$_{1-6}$alkyl, C$_{1-6}$alkylsulfonyl or a group having the formula (II):



(II)

wherein:

- r is 0, 1, 2, 3 or 4;
- A is oxygen or sulfur;
- B is a single bond or –NR$_8$- wherein R$_8$ is hydrogen, C$_{1-6}$alkyl or aryl optionally substituted by one or more substituents independently selected from halogen, oxo, C$_{1-6}$alkyl, CF$_3$, cyano, hydroxy, C$_{1-6}$alkanoyl, and C$_{1-6}$alkoxy;
- D is -(CH$_2$)$_t$-, -(CH$_2$)$_t$O- or -O(CH$_2$)$_t$-, wherein t is 0, 1, 2, 3 or 4; and
- E is C$_{1-6}$alkyl, haloC$_{1-6}$alkyl, C$_{3-7}$cycloalkyl (optionally substituted by one or more halogen, hydroxy, oxo, C$_{1-6}$alkyl, cyano, CF$_3$, OCF$_3$, C$_{1-6}$alkoxy or C$_{1-6}$alkanoyl), or aryl (optionally substituted by one or more substituents independently selected from halogen, oxo, C$_{1-6}$alkyl, CF$_3$, cyano, hydroxy,

C_{1-6}alkanoyl, and C_{1-6}alkoxy); or E is $-NR_9R_{10}$ (wherein R_9 and R_{10} are independently selected from hydrogen, C_{1-6}alkyl and aryl optionally substituted by one or more substituents independently selected from halogen, oxo, C_{1-6}alkyl, CF_3, cyano, hydroxy, C_{1-6}alkanoyl, and C_{1-6}alkoxy);

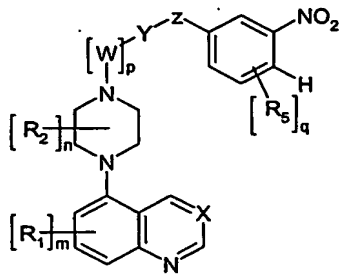
- or R_3 and R_4, together with the nitrogen atom to which R_3 and R_4 are attached, combine to form a 3-7 membered monocyclic heterocyclic group (optionally substituted by 1 to 4 substituents, which may be the same or different, and which is selected from halogen, oxo, C_{1-6}alkyl, cyano, CF_3, C_{1-6}alkoxy and C_{1-6}alkanoyl);
- R_5 is independently halogen, cyano, C_{1-6}alkyl or C_{1-6}alkoxy; and
- q is 0, 1, 2, 3 or 4.

10. A compound as claimed in claim 1, which is:
    - 3-(3-{2-[4-(2-methyl-5-quinolinyl)-1-piperazinyl]ethyl}phenyl)-1,3-oxazolidin-2-one;
    - *N*-(3-{2-[4-(2-methyl-5-quinolinyl)-1-piperazinyl]ethyl}phenyl)-*N'*-phenylurea;
    - *N*-[2-(methyloxy)phenyl]-*N'*-(3-{2-[4-(2-methyl-5-quinolinyl)-1-piperazinyl]ethyl}phenyl)urea;
    - 1-(3-{2-[4-(2-methyl-5-quinolinyl)-1-piperazinyl]ethyl}phenyl)-2-imidazolidinone;
    - 2,4-dimethyl-*N*-(3-{2-[4-(2-methyl-5-quinolinyl)-1-piperazinyl]ethyl}phenyl)-1,3-thiazole-5-carboxamide;
    - *N*-(3-{1-hydroxy-2-[4-(2-methyl-5-quinolinyl)-1-piperazinyl]ethyl}phenyl)-2,4-dimethyl-1,3-thiazole-5-carboxamide;
    - 2-fluoro-*N*-(3-{2-[4-(2-methyl-5-quinolinyl)-1-piperazinyl]ethyl}phenyl)benzamide;
    - 3-(3-{2-[4-(2-methyl-5-quinolinyl)-1-piperazinyl]propyl}phenyl)-1,3-oxazolidin-2-one;
    - 3-(3-{2-[(2R)-2-methyl-4-(2-methyl-5-quinolinyl)-1-piperazinyl]ethyl}phenyl)-1,3-oxazolidin-2-one;
    - 1-methyl-3-(3-{2-[4-(2-methyl-5-quinolinyl)-1-piperazinyl]ethyl}phenyl)-2-imidazolidinone;
    - 1-(4-fluoro-3-{2-[4-(2-methyl-5-quinolinyl)-1-piperazinyl]ethyl}phenyl)-2-imidazolidinone;
    - 3-(4-fluoro-3-{2-[4-(2-methyl-5-quinolinyl)-1-piperazinyl]ethyl}phenyl)-1,3-oxazolidin-2-one;
    - 1-(3-{2-[4-(2-methyl-5-quinolinyl)-1-piperazinyl]ethyl}phenyl)-2,4-imidazolidinedione;
    - 1-(3-{2-[4-(2-methyl-5-quinolinyl)-1-piperazinyl]ethyl}phenyl)-1,3-dihydro-2H-imidazol-2-one;
    - 1-methyl-3-(3-{2-[4-(2-methyl-5-quinolinyl)-1-piperazinyl]ethyl}phenyl)-1,3-dihydro-2H-imidazol-2-one;
    - 4,4-dimethyl-1-(3-{2-[4-(2-methyl-5-quinolinyl)-1-piperazinyl]ethyl}phenyl)-2-imidazolidinone;

or a pharmaceutically acceptable salt thereof.

11. A process for the preparation of a compound as claimed in claim 1, which process comprises:

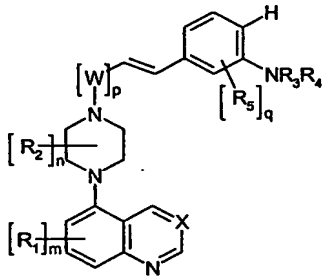
(a) converting a compound of formula (III):



(III)

wherein R_1, m, X, R_2, n, W, p, Y, Z, R_5 and q are as defined in claim 1; or

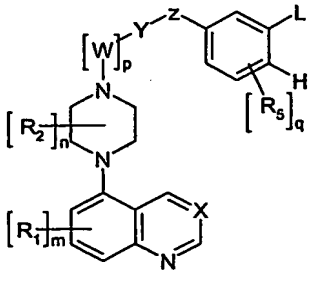
(b) for a compound of formula (I) wherein Y and Z form a cyclopropylene group, converting a compound of formula (IV):



(IV)

wherein R_1, m, X, R_2, n, W, p, R_3, R_4 and R_5 and q are as defined in claim 1; or

(c) reacting a compound of formula (V):



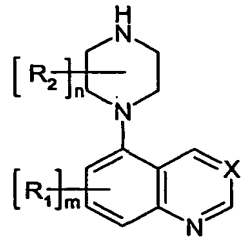
(V)

wherein R_1, m, X, R_2, n, W, p, Y, Z, R_5 and q are as defined in claim 1, and L is a leaving group, with a compound of formula (VI):

$$R_3R_4NH$$
(VI)

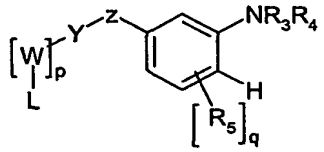
wherein R_3 and R_4 are as defined in claim 1; or

(d) reacting a compound of formula (VII):



(VII)

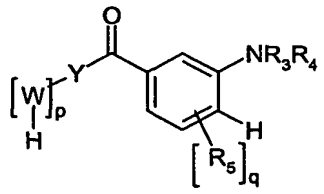
wherein R_1, m, X, R_2 and n are as defined in claim 1, with a compound of formula (VIII):



(VIII)

wherein W, p, Y, Z, R_5, q, R_3 and R_4 are as defined in claim 1, and L is a leaving group; or

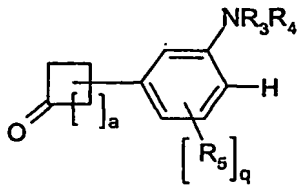
(e) for a compound of formula (I) wherein Z is –CH(OH), reacting a compound of formula (VII) as defined in step (d) with a compound of formula (XIII):



(XIII)

wherein W, p, Y, Z, R_5, q, R_3 and R_4 are as defined in claim 1; or

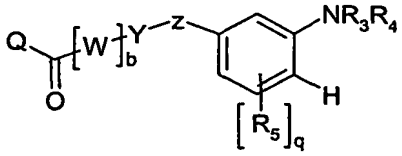
(f) for a compound of formula (I) wherein Y and Z form a C_{3-7}cycloalkylene group, reacting a compound of formula (VII) as defined above with a compound of formula (XIV):



(XIV)

wherein R_5, R_2, R_3 and q are as defined in claim 1 and a is 0, 1, 2, 3 or 4; or

(g) for a compound of formula (I) wherein the group W or Y attached to the nitrogen in the piperazine group in formula (I) is CH_2 or $CH(C_{1-6}alkyl)$, reacting a compound of formula (VII) as defined above with a compound of formula (XV):



(XV)

wherein R_3, R_4, R_5, q, Z, Y and W are as defined in claim 1 and b is 0, 1 or 2 and Q is hydrogen or $C_{1-6}alkyl$;

and thereafter optionally for any of steps (a) to (g):

- removing any protecting groups and/or
- converting a compound of formula (I) into another compound of formula (I) and/or
- forming a pharmaceutically acceptable salt.

12. A compound as claimed in any of claims 1-10 for use as a therapeutic substance.

13. A compound as claimed in any of claims 1-10 for use in the treatment of a CNS disorder.

14. A compound as claimed in claim 13, wherein the disorder is depression or anxiety.

15. A method of treatment of a CNS disorder in a mammal including a human, which comprises administering to the sufferer a therapeutically safe and effective amount of a compound as claimed in any of claims 1-10.

16. A method as claimed in claim 15, wherein the disorder is depression or anxiety.

17. Use of a compound as claimed in any of claims 1-10 in the manufacture of a medicament for use in the treatment of a CNS disorder.

18. Use as claimed in claim 17, wherein the disorder is depression or anxiety.

19. A pharmaceutical composition comprising a compound as claimed in any of claims 1-10, and a pharmaceutically acceptable carrier or excipient.

20. A process for preparing a pharmaceutical composition as defined in claim 19, the process comprising mixing a compound as claimed in any of claims 1-10 and a pharmaceutically acceptable carrier or excipient.